Top Ten Emerging Technologies to Drive Mission Performance

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NDIA Net Centric Operations Conference
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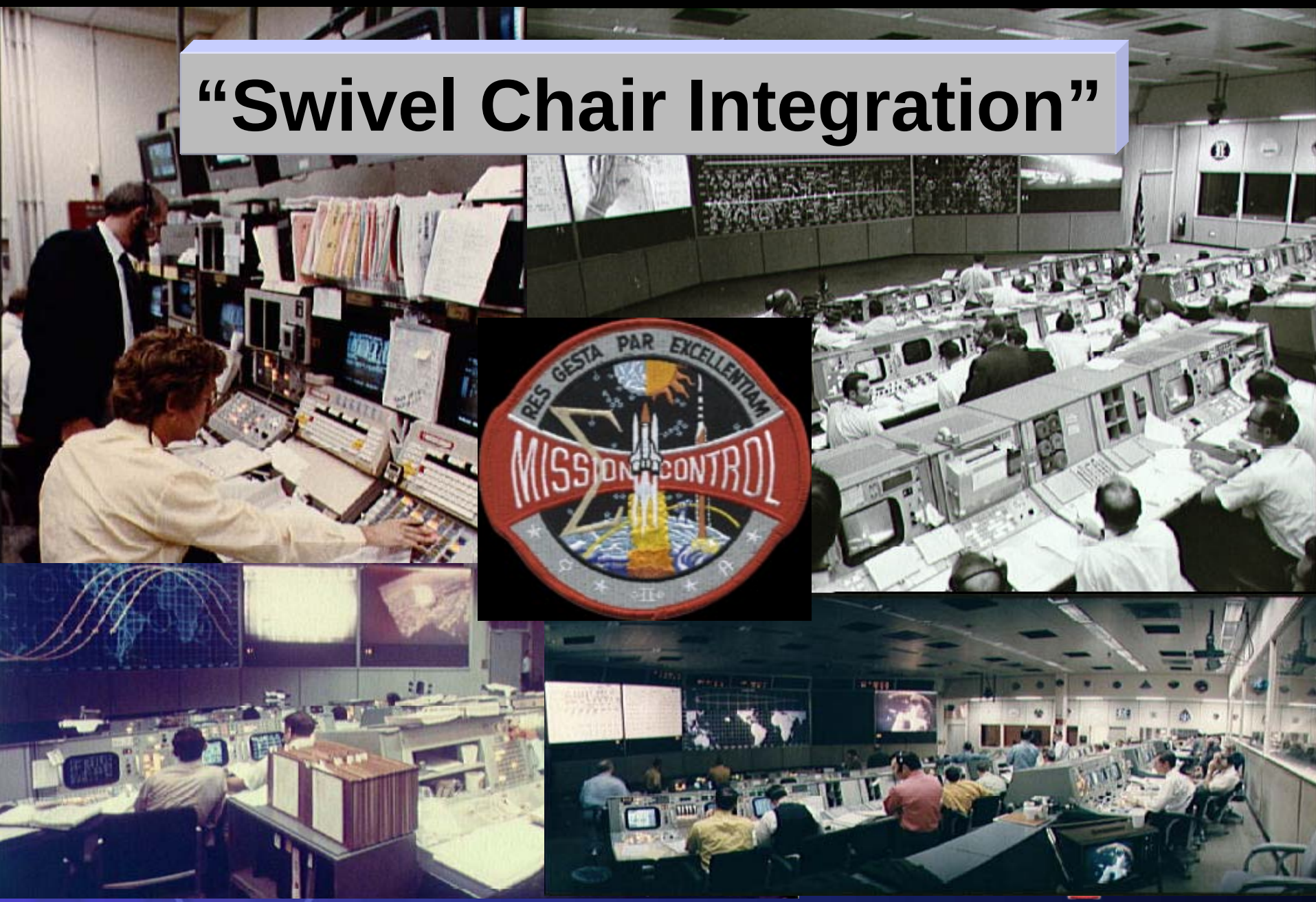
ON DEMAND BUSINESS™

“Swivel Chair Integration”

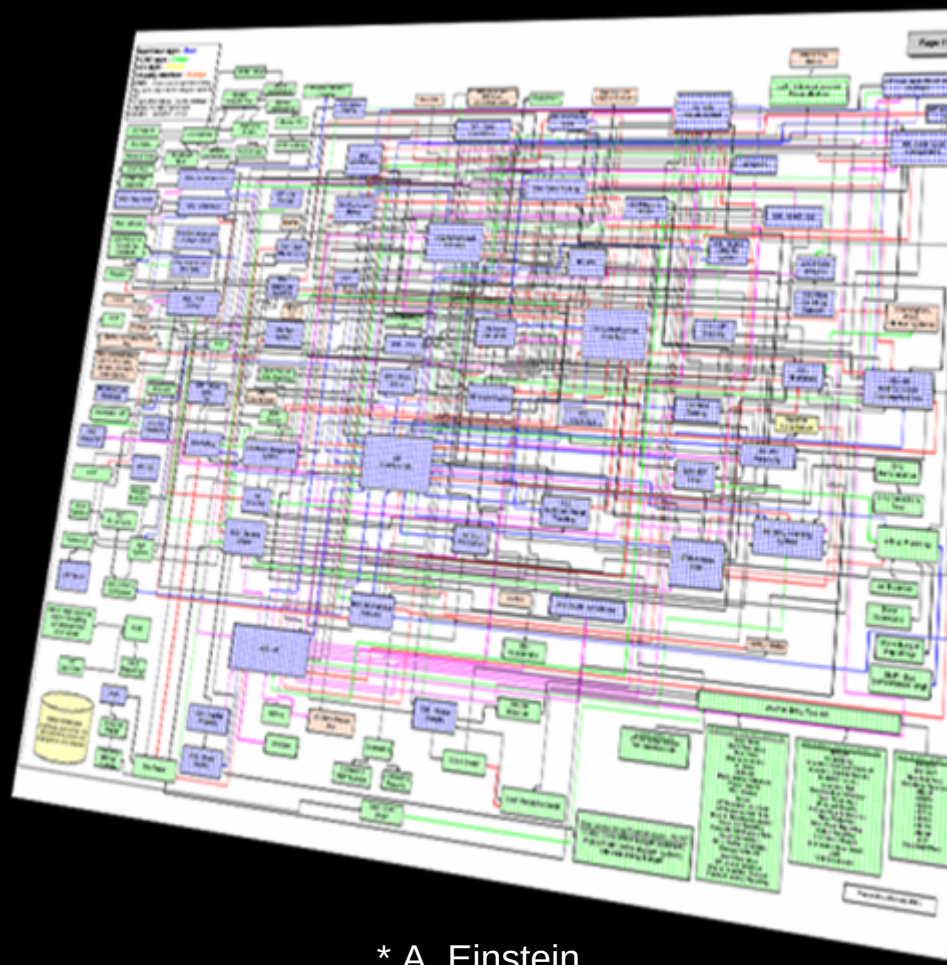


2003: Air Operations Center

So what's changed?

Enterprise-Class IT: "…as Simple as Possible but no Simpler*"

- Complex problems tend to require complex solutions…
- Tradeoff between depth of function and simplicity of use
- Optimizing for best return: Acquisition Cost? Lifecycle cost? Performance? Flexibility?
- What's the scope of "enterprise" anyway?

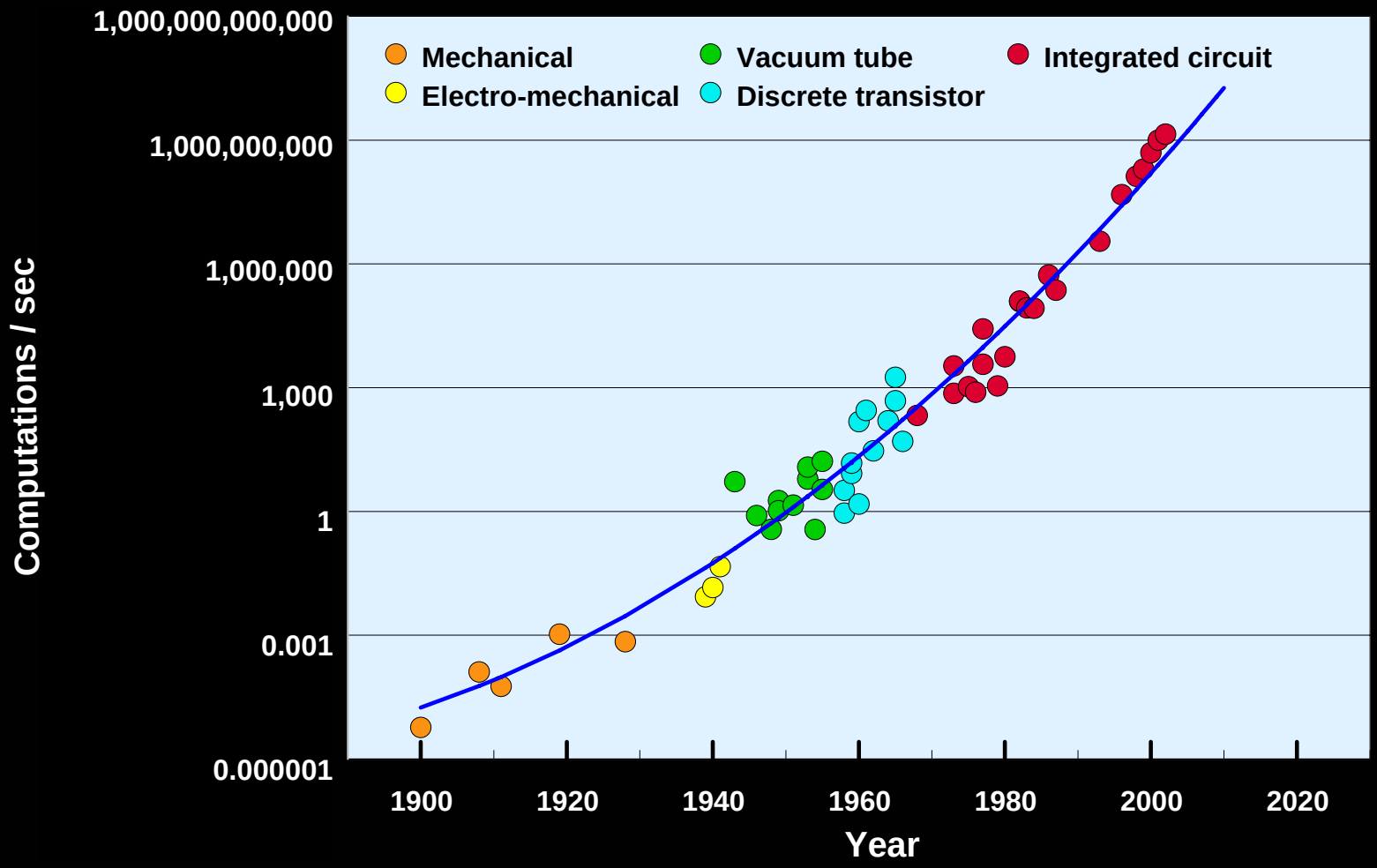


* A. Einstein

Top Ten Emerging Technologies … Four Groups

- Base Technology
- Software, Infrastructure and SOA
- Information Management
- Web 2.0 … The Internet as a Platform

Base Technology: What does $1000 buy?

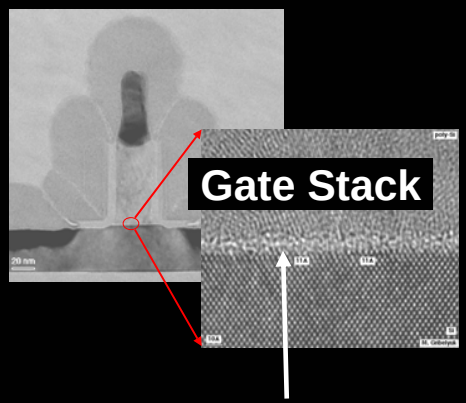


after Kurzweil, 1999 & Moravec, 1998

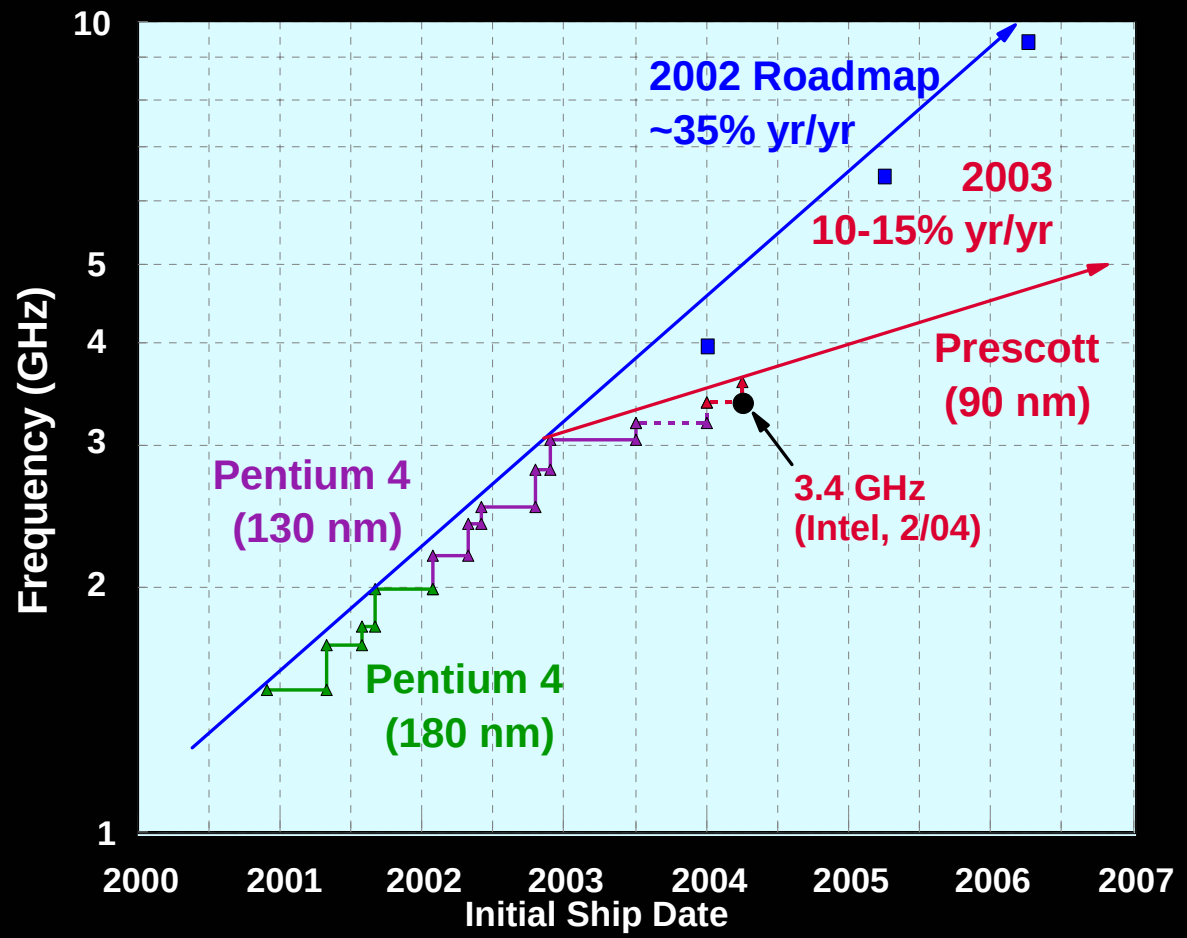
32-bit Processor Trends

Multi-core processors will emerge to offset slow down in frequency growth

- Frequency growth rate historically ~35% (CAGR)
  - Prescott (90 nm): only 10-15% CAGR growth

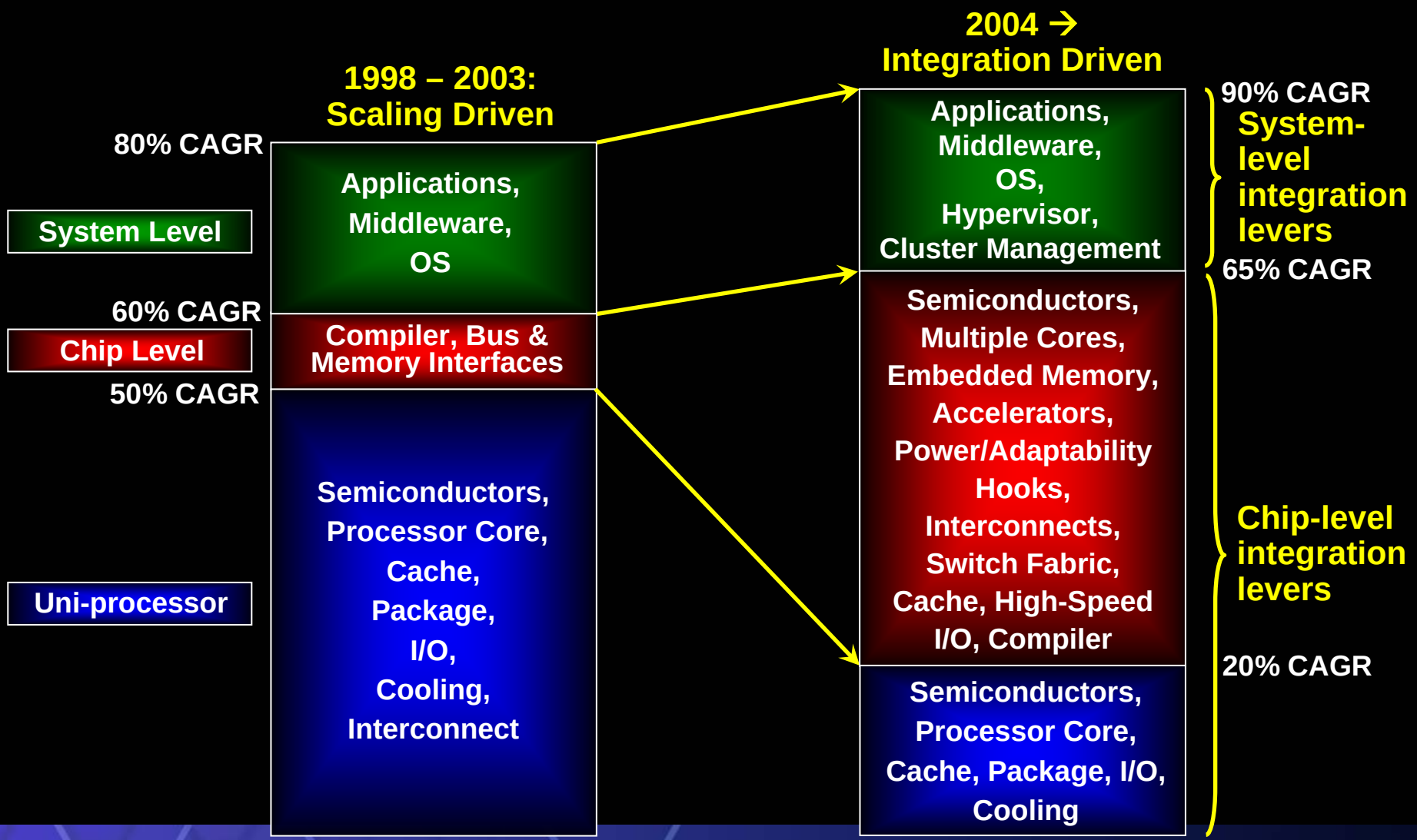


Gate dielectric approaching a fundamental limit (a few atomic layers)



Sources: Competitive Analysis Technical Team (CATT), Intel

Delivering System Performance: Post-Scaling Parallelism



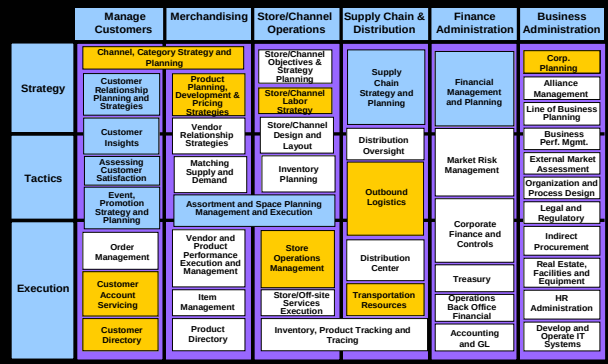
Top Ten Emerging Technologies
The Software, Infrastructure and SOA Group

- Application Optimized Systems
- Event-Driven Architecture

Modularity At All Levels is Enabling a New Era of Application-Optimized Systems

Business Level

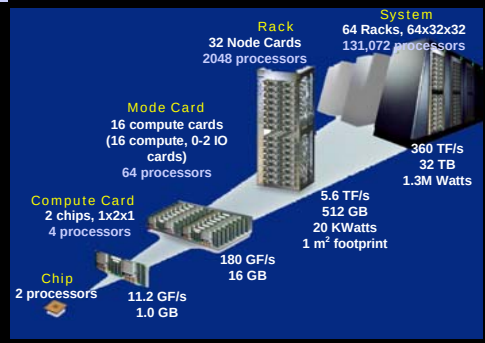
Business processes



Web Services, SOA
Enterprise Service Bus

System Level

Processor blades/drawers/racks



Operating systems, Middleware, Management tools

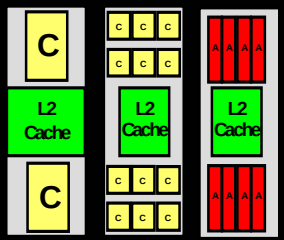
Subsystem Level

Memory, I/O subsystem, Specialty blades

System level design, Protocols

Chip Level

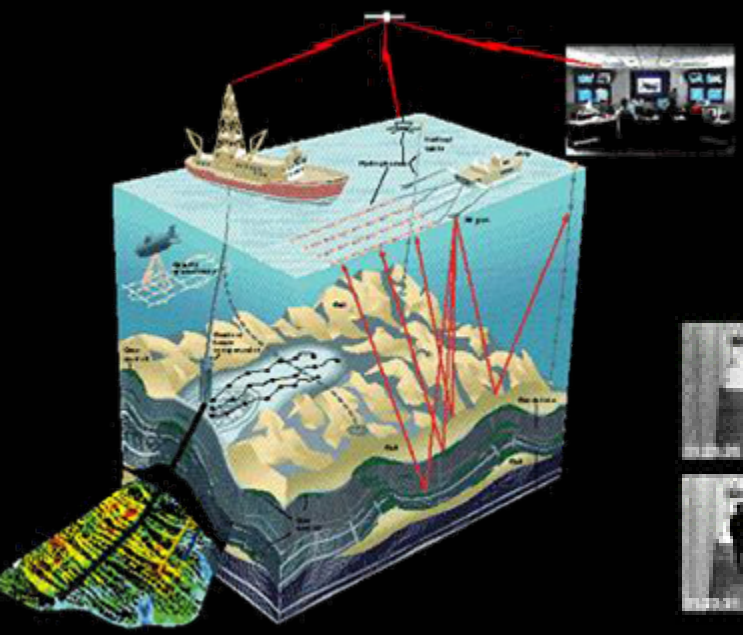
Multi-threads, Multi-cores, Specialty cores, Accelerators, Busses, I/O



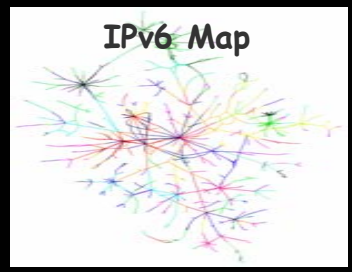
SoC design, Compilers, Libraries

The Power of Modularity – “#1”

The Event-Driven World



Intelligent Oil Field



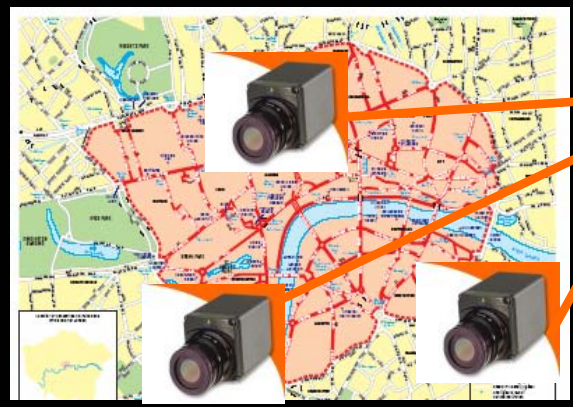
VoIP, VoD, IMS, etc.

Surveillance

RFID-enabled Checkout

RFID-enabled Scanning

Fraud/Compliance

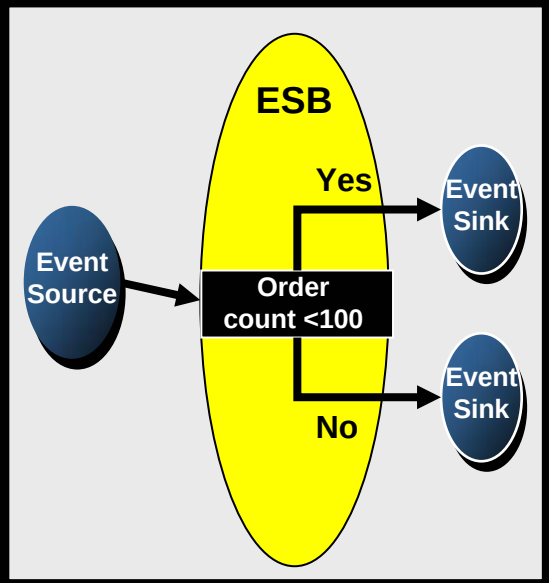


Location Based Service (Traffic)

- Billing
- Security
- Fraud alerts
- Retrospective processing

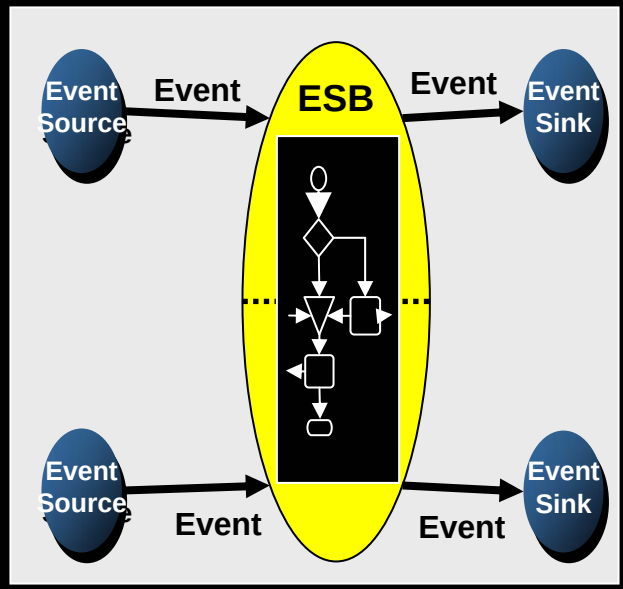
SOA Programming Model for Event Orientation

Routed Events
Intelligent Routing



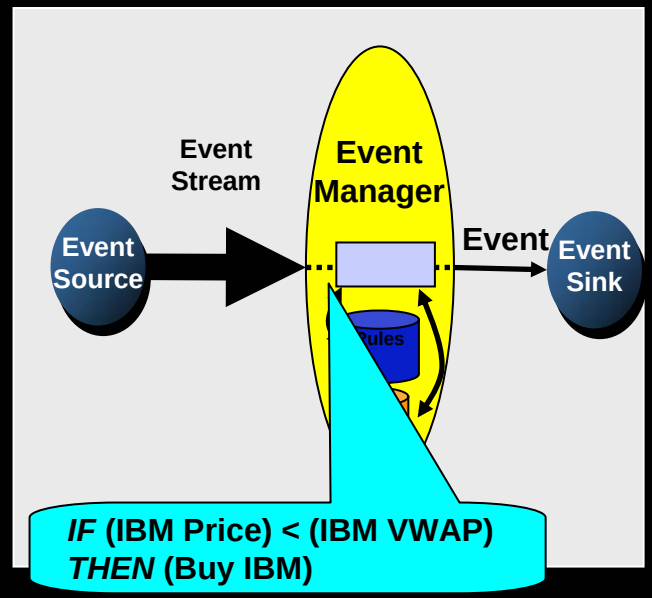
- Combines with brokered event mechanisms
- Content-based routing
- Transformation
- Standards-based, e.g., XML and Web Services

Orchestration Service
Sophisticated Process Flow



- Combines basic ESB services with long running stateful processes (event choreography)
- Supports looping constructs, state management, conditional constructs, forks threads, joins, etc.
- Publish event, wait for event, etc.

Event Stream Processing
Aggregating and Correlating Events



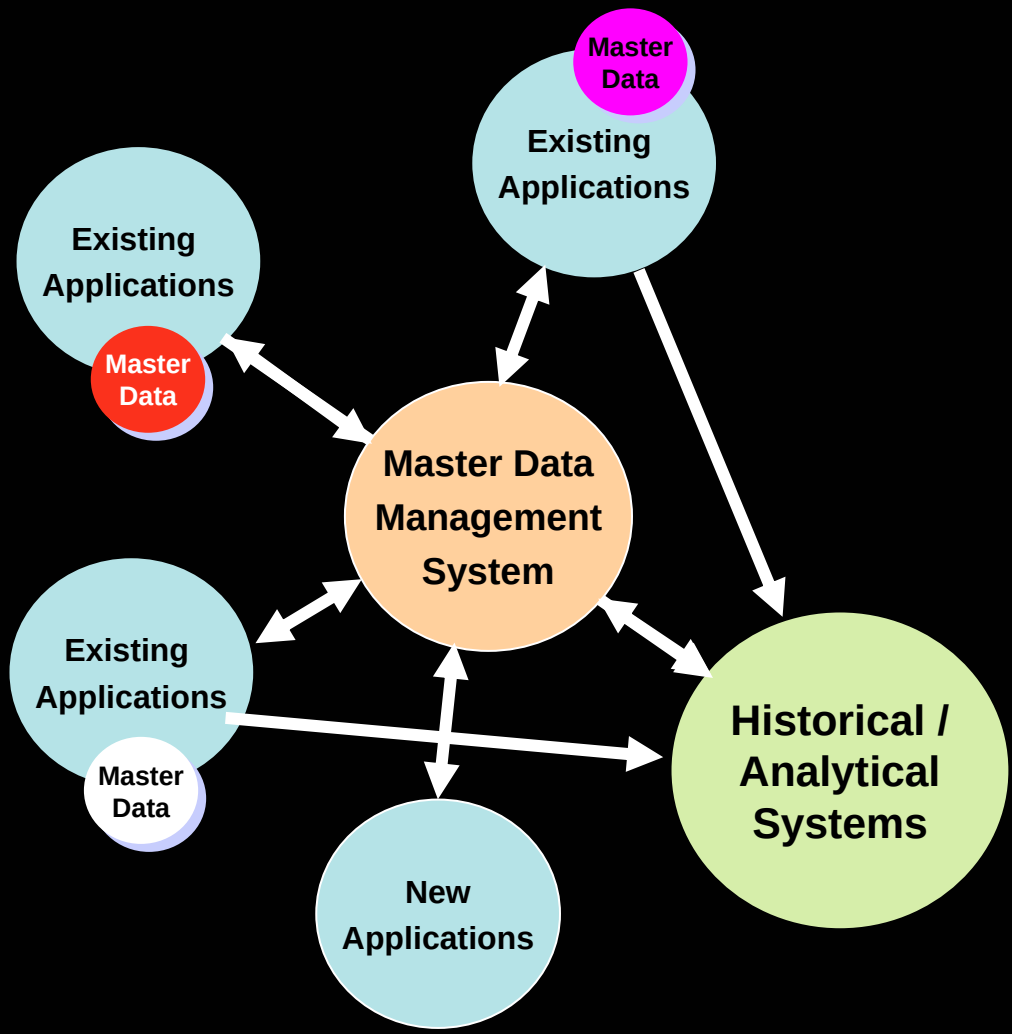
- Event filtering rules
- Aggregation of events
- Event detection patterns
- Not all events pass through
- Event generation, event history

Top Ten Emerging Technologies
The Information Management Group

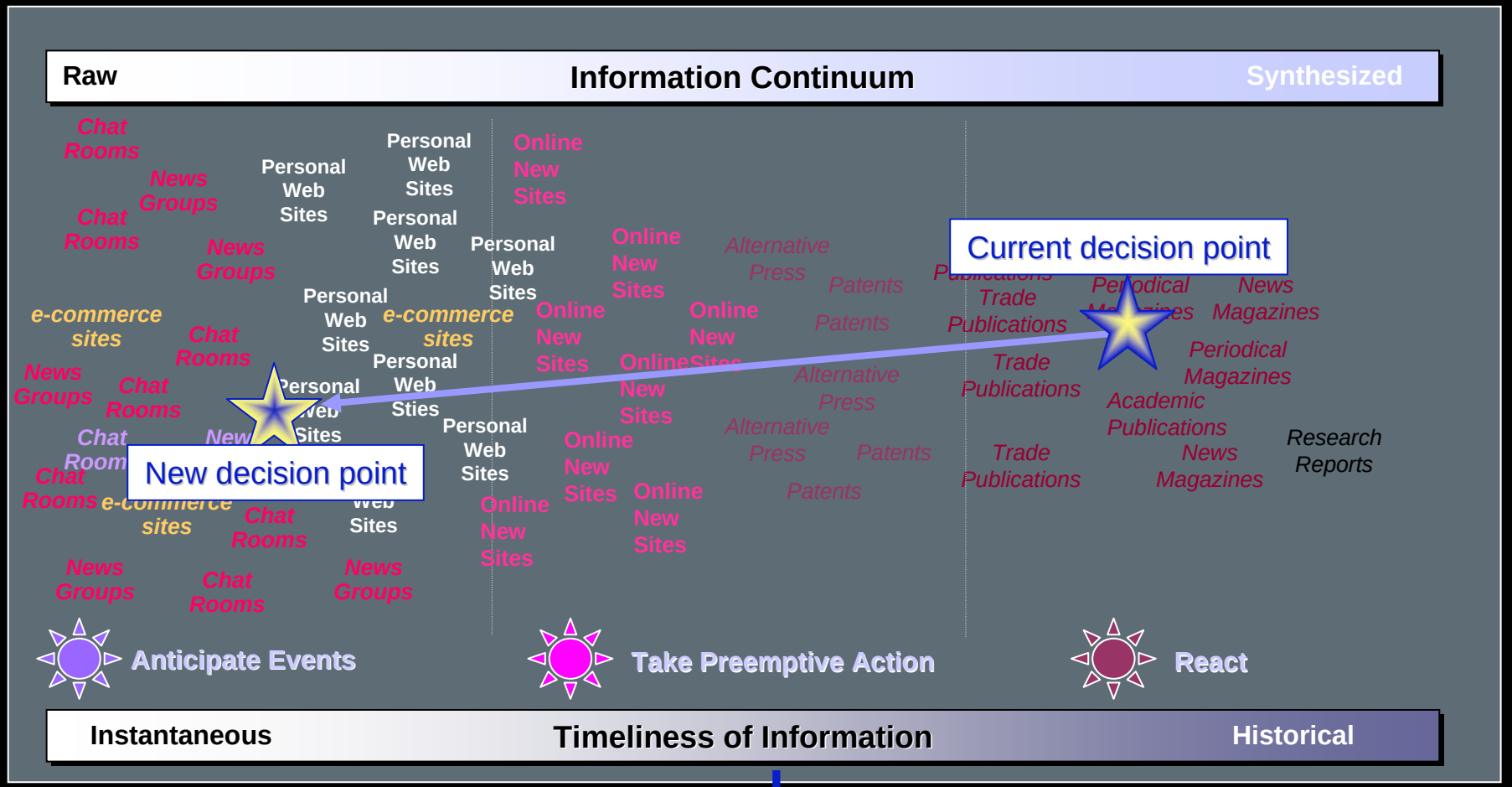
- Master Data Management
- Text Analytics

What is Master Data Management?

- Decouples master information from individual applications
- Becomes a central, application independent resource
- Simplifies ongoing integration tasks and new app development
- Ensure consistent master information across transactional and analytical systems
- Addresses key issues such as data quality and consistency proactively rather than “after the fact” in the data warehouse



Text Analytics: Reaching back into the information pipeline



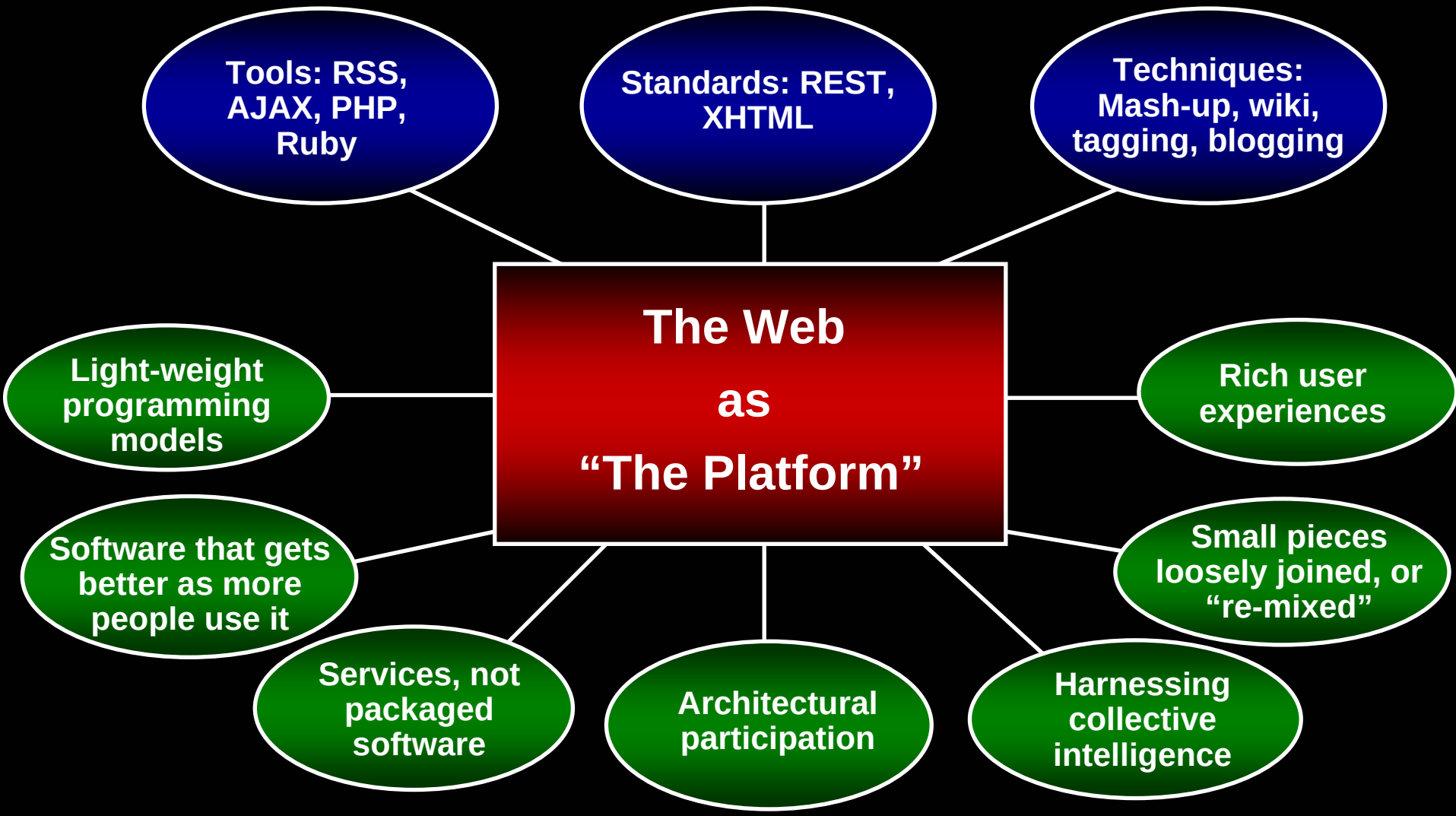
Between 80 and 90 percent of information on the Internet and corporate networks is unstructured.

Goldman Sachs, March 2001

Top Ten Emerging Technologies
The Web 2.0 Group

- Tools: RSS, AJAX, PHP
- Standards: REST, XHTML
- Techniques: Wikis, Blogging, Mash-ups, Tagging

The Web 2.0 Landscape .. A different way of thinking



Art of the Possible: Situational Applications

- Situational application development involves aggregating, customizing, or extending an existing collection of simple web services
  - Built to solve an immediate, specific business problem
  - Typically performed by non-traditional programmers (e.g., business professionals, analysts, other IT staff, etc.)
  - Makes use of pre-existing software components or services such as spreadsheets, report generators or vertical business applications already in use
  - Manipulates static and increasingly dynamic content – information-centric
  - Accelerated by a community-based development approach

Integration is pushed to the edges, just "good enough" for the task at hand…

Rapid Growth of Domain-Specific Services

Examples of companies offering services on the web today, and growing …

amazon web services™
E-Commerce

ups™
Online Tracking

DHL
DHL Web Services

METHODS
Repository for boutique services

salesforce.com
SForce

UNITED STATES POSTAL SERVICE
USPS Web Tools

FedEx
FedEx Tracking

YAHOO!
Search, Maps

Microsoft
Terrafirma

ebay
PayPal

National Oceanic & Atmospheric Administration
U.S. Department of Commerce
NDFD XML

Google Maps BETA
Google Maps API

Mash-up

One Mash-up definition from Wikipedia

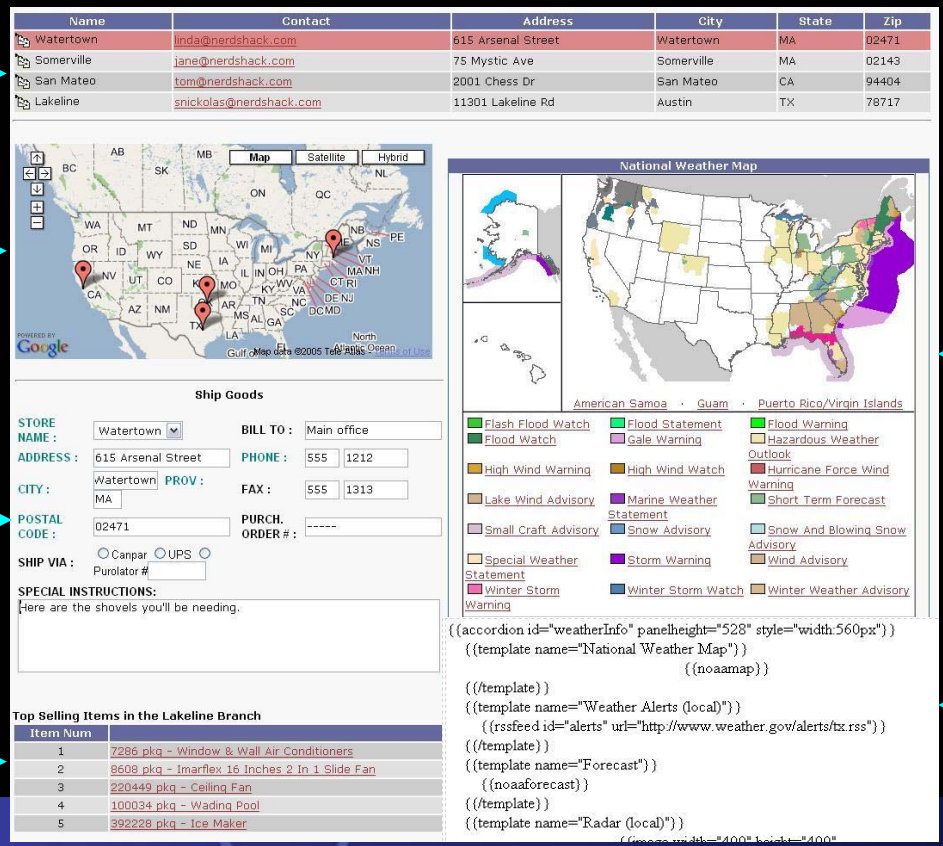
…a musical genre which, in its purest form, consists of the combination (usually by digital means) of the music from one song with the *a cappella* from another. Typically, the music and vocals belong to completely different genres. At their best, bastard pop songs strive for musical epiphanies that add up to considerably more than the sum of their parts.

List of stores

Google Map web service

SAP order fulfillment

RSS feed of top-selling items



NOAA Weather web service

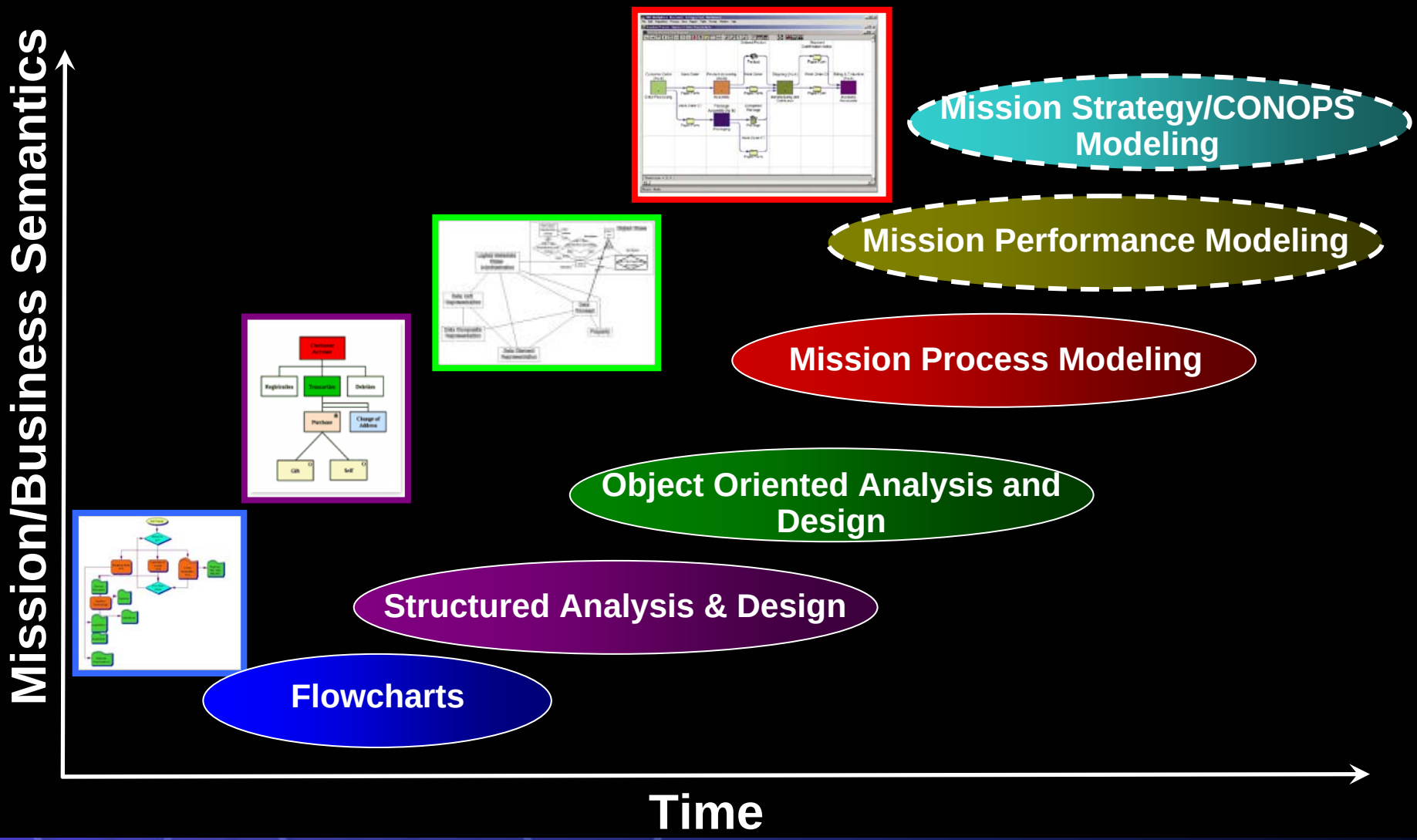
Wiki commands to compose application

Summary: Top Ten Emerging Technologies

10) Low power operation
9) Micro-scale parallelization
8) Application-Optimized Systems
7) Event-Driven Architecture
6) Master Data Management
5) Text Analytics
4) Web 2.0 Tools: RSS, AJAX, PHP
3) Web 2.0 Standards: REST, XHTML
2) Web 2.0 Techniques: Wikis, Blogging, Mash-ups, Tagging

#1: Putting it all Together … Modeling

Evolution Toward Business/Mission Modeling



Examples

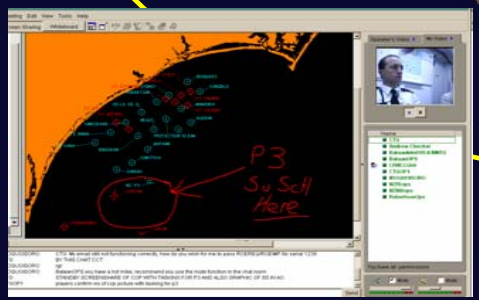
- E-CollabCenter.com
- GCSS-AF
- National Weather Service

IBM's E-CollabCenter.com

Secure Real Time Awareness and Information Sharing for the Warfighter

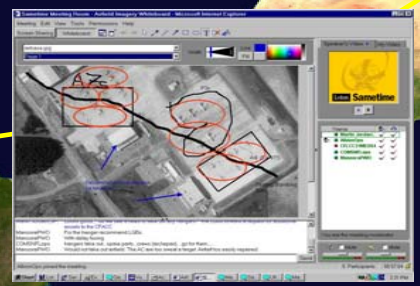
World-wide Instant Messaging with DoD Personnel

Real Time Shared Situational Awareness



Shared Information through Web Conferences

(with or without Audio/Video)



Shared Information through Persistent Chat Rooms

U.S. Air Force: Free developers to spend more time creating value-added business solutions that can scale across entire organization

SOA

Challenge: Point-to-point interfaces between Air Force combat support systems was staggering & costly to maintain

Set Direction

Execute Roadmap

Realize Business Value

WebSphere. software

Tivoli. software

Business Driven Decision:

- Needed a well-designed open architecture to prevent its technology from becoming obsolete thus creating unstable, and fragmented systems
- System modernizations were hampered by the need to support or use proprietary mechanisms to exchange data

Delivering Business Value:

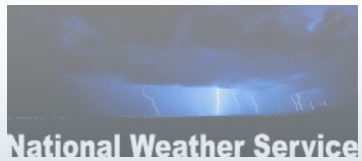
- Has gained huge scale efficiencies
- Has avoided significant software redevelopment costs
- Able to deliver new capabilities more quickly and cost-effectively than before

Through greater IT flexibility:

- Able to have single-sign-on access to more than 200 operational services and capabilities

National Weather Service: Successfully maintain the system on an ongoing basis as changes are required

SOA



Challenge: Maintain full capabilities in the event of extreme system failure or attack

Set Direction

Execute Roadmap

Realize Business Value

WebSphere. software

Tivoli. software

Business Driven Decision:

- Needed to modernize the current legacy systems, to allow expansion of capabilities to handle significant increases in both the volume & size of messages & transactions
- A significant contributing factor to the increased size of messages is the advancement of graphics depicting radar and weather images

Delivering Business Value:

- Throughput has more than doubled, providing over 40 percent more efficiency with the new messaging backbone based on open standards

Through greater IT Flexibility:

- Allows more than half a million messages worldwide on a daily basis

What Have We Learned: Levels of Integration

1. Swivel Chair/Clip Board Integration
   - 1960's – present
   - One system, one screen, one "service"
   - Caused by "silos" and generally strongly protected and entrenched
2. Integration at the "glass"
   - 199X – present
   - From Browser based aggregation
   - To a sophisticated role based portal
3. EAI – Enterprise Application Integration
   - 1990's to present
   - Workflow or BPM, current core standard is BPEL
4. Application Integration
   - Eco-systems around an "application" (e.g. ERP)
   - ETL (Extract, Transform, Load)
   - Information Streaming (e.g. Ground Stations)
5. Information Federation
   - Reach out for Information, aggregate "query"
   - Search (structured and unstructured)

So why is this important?

Swivel Chair Integration: The End Result?

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